

REMARKS

Claims 1-5 and 7-30 are pending in the application. Claims 1, 10 and 19 have been amended.

In the Office Action, claims 1-30 were rejected under 35 U.S.C. §112, first paragraph, because the term “non rule-based classifier”, as used in the independent claims, is not described in the specification. Regarding independent claim 22, this claim does not contain the term “non rule-based classifier”, so the rejection is improper as to claim 22 and as to claims 23-30, which depend from claim 22, and should be withdrawn. Regarding independent claims 1, 10, and 19, these claims have been amended to eliminate the terminology complained of by the Examiner. The term “non rule-based classifier” has been replaced in claims 1, 10 and 19 with the term “classic classifier”. These amendments are supported, for example, at page 7, lines 28-31 of the present application. Applicant believes that these amendments are fully responsive to the Examiner’s concerns.

Claims 1-5 were rejected under 35 U.S.C. §103(b) as being unpatentable over U.S. Patent 6,047,083 (Mizuno) in view of U.S. Patent 5,768,333 (Abdel-Mottaleb). Claim 6 was rejected under 35 U.S.C. §103(a) as being unpatentable over Mizuno in view of the discussion at page 11, lines 7-30 of the present application. Claims 7-9 were rejected under 35 U.S.C. §103(a) as being unpatentable over Mizuno in view of Abdel-Mottaleb and further in view of U.S. Patent 5,172,421 (Nakamura). Claims 10-18 and 22-30 were rejected as claims 1-9, because they are claiming similar subject matter as claims 1-9. Claims 19, 20 and 21 were rejected as claims 1, 8 and 9, because they are claiming similar subject matter as claims 19, 20 and 21. These rejections are respectfully traversed. Applicant respectfully requests reconsideration and allowance of the claims in view of the following arguments.

The present invention and the cited references were discussed in detail in Applicant's Amendment of August 13, 2002. For convenience, Applicant refers the Examiner to that discussion.

The present invention utilizes the best attributes of three different types of classifiers to perform defect classification more quickly and reliably than prior art methodologies. It employs a rule-based core classifier for fast initial classification of defects into a predetermined number of core classes, the core classifier being able to work during start-up and ramp-up of a production line because it does not require examples of defects. It also uses non rule-based specific adaptive classifiers (i.e., "classic classifiers"), each associated with only a small number of the core classes (e.g., with only one or two core classes), trained by the user with sample defect images, in parallel with the core classifier for sub-classification within a core class. The present invention further employs a full classifier (also based on sample defect images), but only on a limited basis for special types of defects that do not fit in to the core classification scheme. Thus, as the fabrication process matures and the types of defects of interest become more diverse, the specific adaptive and full classifiers can be trained as needed to perform more detailed defect classification.

None of the cited prior art references, alone or in combination, teaches or suggests an apparatus or a method that employs both a rule-based core classifier and a specific adaptive classifier associated with only a small number of the core classes that is a classic classifier trained by the user with a set of sample defect images, as required by independent claims 1, 10, 19 and 22.

Regarding the obviousness rejection of independent claims 1, 10, 19 and 22 based on Mizuno and Abdel-Mottaleb, the primary Mizuno reference teaches the use of a rule-based core classifier to classify defects into one of a predetermined number of core classes. However, as admitted in the Office Action, Mizuno fails to teach or suggest using a specific adaptive classifier

associated with the one core class and less than the predetermined number of core classes, and trained by the user with a set of sample defect images, to further classify the defect into a subclass, as required by independent claims 1, 10, 19 and 22. Rather, Mizuno teaches using a core classifier for this function. In other words, Mizuno uses a rule-based classifier to initially classify defects, and also to subclassify the defects.

It is contended in the Office Action that since Abdel-Mottaleb teaches the use of a non rule-based classifier associated with less than a predetermined number of core classes of defects trained by the user with sample defect images, it would have been obvious to combine the teachings of Mizuno and Abdel-Mottaleb to yield the claimed invention. Applicant disagrees. Abdel-Mottaleb does not teach or suggest using non rule-based classic classifiers associated with less than a predetermined number of core classes of defects to sub-classify defects, as claimed.

The cancer detection technique of Abdel-Mottaleb includes a first stage classification which identifies "candidate suspect masses", and a second stage classification wherein each candidate suspect mass is classified as either a true positive or a false positive (col. 2:65 to col. 3:1; col. 3:23-27 and 37-44). Contrary to the contentions at page 4 of the Office Action, Abdel-Mottaleb does not perform its initial classification into "at least 8" core classes of defects. Abdel-Mottaleb's first stage classification is a "go/no-go" test that only identifies suspect masses for further study, as explained at col. 6:49-51. In other words, the first stage identifies possible defects (i.e., the suspect masses); it does not classify defects as being in one of a predetermined number of core classes, as claimed. The table in col. 7 of Abdel-Mottaleb, cited in support of the Office Action's contentions, is one set of rules that is used by Abdel-Mottaleb's rule-based first classification stage (see col. 7:11-16). The lines k=1-8 of the table do not represent different core classes, as contended in the Office Action. Since Abdel-Mottaleb does not teach or suggest that its first stage classification is into one

of a predetermined number of core classes of defects, it cannot teach or suggest that its classic-type second stage classifier is a subclassifier associated with less than a predetermined number of core classes of defects, as claimed.

Mizuno does not teach or suggest that its rule-based subclassifier is associated with less than a predetermined number of core classes of defects either.

Since neither Mizuno nor Abdel-Mottaleb teaches or suggests the claimed classic-style specific adaptive classifier associated with less than a predetermined number of core classes of defects and trained by the user with a set of sample defect images, any combination of these references, however made, would still be missing this important claimed feature. Moreover, it would not have been obvious to modify any Mizuno/Abdel-Mottaleb combination to yield the invention of claims 1, 10, 19 or 22.

Thus, it would not have been obvious to combine Mizuno and Abdel-Mottaleb to yield the inventions of independent claims 1, 10, 19, and 22, because no combination of these references teaches or suggests the step of classifying a defect as being in one of an arbitrary number of variant subclasses using a specific adaptive classifier associated with less than a predetermined number of core classes that is a classic classifier trained by the user with a set of sample defect images, as required by independent claims 1 and 22; and does not disclose or suggest a specific adaptive classifier associated with less than a predetermined number of core classes for classifying the defect as being in one of an arbitrary number of variant subclasses that is a classic classifier trained by the user with a set of sample defect images, as required by independent claims 10 and 19.

Consequently, claims 1, 10, 19 and 22 are patentable, as are claims 2-5, 11-14, 23-26, and 30, which depend from claims 1, 10, 19 and 22, respectively.

Regarding the obviousness rejection of claims 6 and 15 based on Mizuno and page 11, lines 7-30 of the application, it is contended in the Office Action that the Applicant admits (at page 11, lines 7-30) that a plurality of specific adaptive classifiers as claimed in claims 6 and 15, each associated with less than a predetermined number of core classes, is in the prior art. This is not correct. There is no support at page 11 or anywhere else in the specification for the contention that Applicant considers the claimed plurality of specific adaptive classifiers to be in the prior art. In fact, the application is replete with statements as to the inventiveness of the claimed specific adaptive classifiers. See, for example, page 7, lines 28 et seq., distinguishing specific adaptive classifiers from prior art classic classifiers.

Since all the limitations of claims 6 and 15 are not found in the cited references, the rejection under § 103 should be withdrawn. Consequently, claims 6 and 15 are patentable.

Regarding the obviousness rejection of claims 7-9, 16-18, 20-21 and 27-29 based on the Mizuno, Abdel-Mottaleb and Nakamura references, Nakamura does not teach or suggest the recited specific adaptive classifier of independent claims 1, 10, 19 and 22 (from which claims 7-9, 16-18, 20-21 and 27-29 depend) missing from Mizuno and Abdel-Mottaleb. Nakamura teaches a rule-based classifier (see Nakamura, Abstract). Moreover, Nakamura does not teach a classifier associated with a particular core class, as claimed. Still further, Nakamura does not teach the claimed combination of a core classifier and a specific adaptive classifier associated with a particular core class. Therefore, any combination of Mizuno, Abdel-Mottaleb and Nakamura, however made, would still be missing the claimed specific adaptive classifier, and it would not have been obvious to add the claimed specific adaptive classifier to any Mizuno/Abdel-Mottaleb/Nakamura combination.

Consequently, claims 7-9, 16-18, 20-21 and 27-29 are patentable.

Reconsideration and withdrawal of the rejection of claims 1-30 under 35 U.S.C. §103 are respectfully requested.

Accordingly, it is believed that all pending claims are now in condition for allowance. Applicant therefore respectfully requests an early and favorable reconsideration and allowance of this application. If there are any outstanding issues which might be resolved by an interview or an Examiner's amendment, the Examiner is invited to call Applicant's representative at the telephone number shown below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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